

PUNCTURING DEVICE

5

(Background of the Invention)

1. Field of the Invention

10 This invention relates to the puncturing device designed particularly for puncturing patient's skin in order to collect a blood sample for diagnostic purposes.

2. Description of the Related Art

The U.S. patent No. 5,356,420 discloses a puncturing device comprising a sleeve 15 and a push element positioned at the first end of the sleeve. The other end of the sleeve ends with a bottom with an opening therein. Inside the sleeve a piston is slidably mounted, terminating with a push rod at the end closer to the push button, and with a puncturing tip at the end closer to the bottom opening. Inside the sleeve between the push element face and the piston, a drive spring is located, and between the piston and 20 the sleeve bottom a return spring is placed. The piston comprises wings located on its outer perimeter which rest on an internal projection of the sleeve.

Further, the US patent No. 5,439,473 discloses a lancet designed for puncturing patient's skin for the sake of collecting small blood samples. The lancet has elongated housing, wherein a movable member is disposed sliding along the housing axis, while 25 the housing has a top opening for the lancet push button, and a bottom opening for the piercing blade. The movable member consists of a flat spring, one end of which is linked to the push button. The push button has two upper arms perpendicular to its surface, and those arms have hooked ends disposed in oblong openings of the housing side walls. The other end of the movable member flat spring is joined with a holder wherein the piercing

blade is fixed. The holder lower portion has two lower arms parallel to the upper arms. The lower arms have moreover upwardly directed, triangle shaped tips, which rest upon the lower edges of the oblong openings of the housing walls. All parts of the movable member are made of plastics.

5 When the patient's skin is being punctured, the lancet press button is pressed, by what the flat spring of the movable member is tensed, and hooked ends of the upper arms press against the tips of the lower arms of the movable member. Next the release of the lower arms occurs, the flat spring rebounds, and the patient's skin is punctured by the piercing blade which passes through the housing bottom opening. After puncturing the
10 flat spring assumes free position, and the piercing blade retracts inside the lancet housing.

Further, the US Patent No. 5,755,733 discloses a lancet device consisting of a lancet assembly and a holder linked to the lancet assembly, wherein the lancet assembly has a lancet with piercing portion, and an ejector which pushes the lancet out. In the
15 known lancet device the lancet piercing portion is covered with plastic material.

(Summary of the Invention)

According to the present invention, the puncturing device comprises a housing
20 wherein the push button and the puncturing needle is disposed, wherein the push button has arms to guide the push button inside the housing, and a driving spring, one end of which is linked to the push button, and the other end drives the puncturing needle, and the puncturing needle has breakable wings which rest against the breaking edge of the housing, and it comprises at least one return spring connected to the push button arms,
25 while the puncturing needle has at least one side jut disposed inside the device between the return spring and the other end of the driving spring.

Preferably it has two return springs, each of which is connected to one arm of the push button, and two side juts, each of which is disposed inside the device between one of the return springs and the other end of the driving spring.

Preferably the return springs are connected approximately perpendicularly to the lower portions of the push button arms.

Preferably the first end of the driving spring is connected to the push button face.

Preferably the other end of the driving spring ends with a pusher for the
5 puncturing needle.

Preferably the driving spring is S-letter shaped.

Preferably the return springs are flat springs.

An advantage of the solution according to the present invention is a fact that it facilitates puncturing the patient's skin in a safe and cost-efficient manner.

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(Brief description of the drawings)

The accompanying drawings, which are incorporated in, and form a part of the
15 specification, illustrate the embodiment of the present invention and, together with the description, serve to explain the principles of the invention. In the drawings:

Fig. 1 shows the longitudinal section of the puncturing device according to the invention before use;

Fig. 2 shows the device from the Fig. 1 before breaking the wings;

20 Fig. 3 shows the device from the Fig. 1 after breaking the wings; and

Fig. 4 shows the device from the Fig. 1 during puncturing the patient's skin,
whereas the same elements of the puncturing devices depicted on the drawing
have the same designations.

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(Detailed description of the Invention)

Reference will now be made in detail to the preferred embodiment of the invention, the example of which is illustrated in the accompanying drawings.

The puncturing device depicted in the Fig. 1 is built of a housing (1), where in the top opening (2) of the housing a push button (3) is positioned, while in the lower, elongated opening (4) of the housing (1) is in turn disposed the puncturing needle (5). The push button (3) is made of plastic, and consists of the push button face (6) and parallel to the housing (1) axis and expanding from the opposite ends of the push button face (6) arms (7, 8) to guide the push button (3) in the housing (1). Each of the arms (7, 8) has also a detent (9, 10) to fix the push button (3) in the housing (1). Moreover the push button (3) has a driving spring (11) shaped like the letter "S", which is linked on one side to the push button face (6), and on the other end tipped with the pusher (12) for the puncturing needle (5), and has two flat return springs (13, 14), each of which is mounted approximately parallel to lower portions of the arms (7, 8) of the push button (3). The puncturing needle (5), which is disposed in the lower, oblong opening (4) of the housing (1), has in its upper portion two side juts (15, 16), which are disposed in the device according to the invention between the pusher (12) of the driving spring (11) of the push button (3), and the return springs (13, 14), and in its lower portion breakable wings (17, 18), which rest against the upper edge of the lower, elongated opening (4), which is the breaking edge (19) for the wings (17, 18). Inside the puncturing needle (5) a lancet (20) is disposed, while the puncturing portion (21) of the lancet (20) has a shield (22) of plastic.

20 The operation of the device according to the invention is as follows:

The position of the device elements before use is shown in the Fig. 1, where the push button (3) is in the upper position, and the breakable wings (17, 18) rest against the breaking edge (19). After detachment of the shield (22) of the piercing portion (21) of the lancet (20), the push button face (6) is pressed, causing compressing the driving spring (11), as it is depicted in the Fig. 2, to the moment when the driving spring (11) is maximally compressed, and breaking off the wings (17, 18) occurs. Then the driving spring (11) expands, in result of which the puncturing needle (5) with the lancet (20) displaces in the lower opening (4) of the housing (1), while the side juts (15, 16) of the puncturing needle (5) press the return springs (13, 14), as it is shown in the Fig. 3. Next

the puncturing portion (21) of the lancet (20), protruding outside the lower opening (4) of the housing (1) punctures the patient's skin, while the side juts (15, 16) of the puncturing needle (5) cause maximum deflection of the return springs (13, 14), as it is shown in the Fig. 4. After puncturing the skin, the return springs (13, 14) pull, with the help of the side juts (15, 16), the puncturing needle (5) inside the lower opening (4) of the housing (1), while the driving spring (11) and the return springs (13, 14) are then in free state, as it is shown in the Fig. 3.

Subsequent re-use of the device is not possible because the wings (17, 18) of the puncturing needle (5) are already broken off.